

# POSTSINGULAR

Rudy Rucker

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## Dedication

*For Georgia, Rudy, and Isabel!*

## Acknowledgments

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Chapters 3 and 4, “Orphid Night” and “Chu’s Knot,” appeared as a single story, “Postsingular,” in *Isaac Asimov’s Science Fiction Magazine*, September 2006.

# Contents

PART I.....	5
Ignition.....	5
Nant Day.....	9
Orphid Night.....	20
Chu’s Knot.....	36
PART II.....	52
The Big Pig Posse.....	52
Nektar’s Beetles.....	68
The Grill in the Wall.....	76
PART III.....	92
Thuy’s Metanovel.....	92
The Attack Shoons.....	106
The Ark of the Nants.....	124
PART IV.....	145
The Hibrane.....	145
Lazy Eight.....	162

# PART I

## CHAPTER 1

### Ignition

Two boys walked down the beach, deep in conversation. Seventeen-year-old Jeff Luty was carrying a carbon-fiber pipe rocket. His best friend, Carlos Tucay, was carrying the launch rod and a cheap bottle of Mieux champagne. Gangly Jeff was a head taller than Carlos.

“We’re unobservable now,” said Jeff, looking back down the sand. It was twilight on a clear New Year’s Day in Stinson Beach, California. Jeff’s mother had rented a cheap cottage in order to get out of their cramped South San Francisco apartment for the holiday, and Carlos had come along. Jeff’s mother didn’t like it when the boys fired off their homemade rockets; so Jeff had promised her that he and Carlos wouldn’t bring one. But of course they had.

“Our flying beetle,” said Carlos with his ready grin. “Your program says it’ll go *how* high? Tell me again, Jeff. I love hearing it.”

“A mile,” said Jeff, hefting the heavy gadget. “Equals one thousand, six hundred and nine-point-three-four-four meters. That’s why we measured out the fuel in milligrams.”

“As if this beast is gonna act like your computer simulation,” laughed Carlos, patting the thick rocket’s side. “*Yeek!*” The rocket’s tip was a streamlined plastic cone with a few thousand homegrown nanochips inside. The rocket’s sides were adorned with fanciful sheet metal fins and a narrow metal pipe that served as a launch lug. Carlos had painted the rocket to resemble an iridescent blue-green beetle with toothy jaws and folded spiky legs.

“We’re lucky we didn’t blow up your mom’s house when we were casting the motor,” said Jeff. “A kilogram of ammonium nitrate fertilizer and powdered magnesium metal mixed into epoxy binder, *whoa.*” He hefted the rocket, peering up the beetle’s butt at the glittering, rubbery fuel. The carbon-fiber tube was stuffed like a sausage casing.

“Here’s to Lu-Tuc Space Tech!” said Carlos, peeling the foil off the champagne cork. He’d liberated one of the bottles that Jeff’s mother was using to make mimosas for herself and her boyfriend and Jeff’s older sisters.

“Lu-Tuc forever,” echoed Jeff. The boys dreamed of starting a company some day. “It’ll be awesome to track our nanochips across the sky,” Jeff continued. “Each one of them has a global positioning unit and a broadcast antenna.”

“They do so much,” marveled Carlos.

“And I grew them like yeast,” said Jeff. “In the right environment these cute little guys can self-assemble. If you know the dark secrets of robobiohackery, that is. And if you have the knack.” He waggled his long, knobby fingers. His nails were bitten to the quick.

“You’re totally sure they’re not gonna start reproducing themselves in the air?” said Carlos, working his thumbs against the champagne cork. “We don’t want Lu-Tuc turning the world into rainbow goo.”

“That won’t happen yet,” said Jeff and giggled. “Dammit.”

“You’re sick,” said Carlos, meaning this as praise. The cork popped loose, arcing high across the beach to meet its racing shadow.

It was Carlos’s turn to giggle as the foam gushed over his hands. He took a swig and offered the bottle to Jeff. Jeff waved him off, intent on his future dreams.

“I see an astronomically large cloud of self-reproducing nanobots in orbit around the sun,” said Jeff. “They’ll feed on space dust and solar energy and carry out calculations too vast for earthbound machines.”

“So *that’s* what self-reproducing nanomachines are good for,” said Carlos.

“I’m gonna call them *nants*,” said Jeff. “You like that?”

“Beautiful,” said Carlos, jamming the launch rod into the sand a few meters above the waterline. “I claim this kingdom for the nants.”

Jeff slid the rocket down over the launch rod, threading the rod through the five-inch metal tube glued to the rocket’s side. He stuck an igniter wire into the molded engine, secured the wire with wadding, and attached the wire’s loose ends to the ignition unit: a little box with an antenna.

“The National Association of Rocketry says we should back off seven hundred feet now,” said Jeff, checking over their handiwork one last time.

“Bogus,” said Carlos. “I want to watch our big beetle go throbbing into the air. We’ll get behind that dune here and peek.”

“Affirmative,” said Jeff.

The boys settled onto the lee slope of a low dune and inched up until they could peer over the crest at the gaudy fat tube. Carlos dug a little hole in the sand to steady the champagne bottle. Jeff took out his cell phone. The launch program was idling on the screen, cycling through a series of clock and map displays.

“You can really see the jetliners on that blue map?” asked Carlos, his handsome face gilded by the setting sun.

“You bet. Good thing, too. We’ll squirt up our rocket when there’s a gap in the traffic. Like a bum scuttling across a freeway.”

“What’s the cluster of red dots on that next map?”

“Those are the nanochips in the rocket’s tip. At apogee, the nose cone blows off and the dots scatter.”

“Awesome,” said Carlos. “The beetle shoots his wad. Maybe we should track down some of those nanochips after they land.”

“We go visit some guy in the Sunset district, and we’re, like, congratulations, a Lu-Tuc nant is idling in your driveway!” said Jeff, his homely face wreathed in smiles.

“Gosh, Mr. Luty, can I drive it to work?” rified Carlos, sounding like an earnest wage earner. “You got a key?”

“Here comes a gap in the planes,” said Jeff.

“Go,” answered Carlos, his face calm and dreamy.

“T minus one hundred twenty seconds,” said Jeff, punching in a control code. In two minutes the phone would signal the ignition unit.

Only now, damn, here came a ponytailed woman jogging along the beach with a dog. And of course she had to stop by the rocket and spot the boys. Jeff paused the countdown.

“What are you doing?” asked the woman, her voice like a dentist’s drill. “Do you have permission for this?”

“It’s just a little toy rocket kit I got for Christmas,” called Carlos. “Totally legit, ma’am. No problem. Happy New Year.”

“Well—you two be careful,” said the woman. “Don’t set off that thing while I’m around. Hey, come here, Guster!” Her dog had lifted his leg to squirt pee onto the rocket’s side. Embarrassed now, the woman jogged off.

“Bounce, bounce, bounce,” said Carlos loud enough for her to hear, and then switched to an officious tone. “I recommend that you secure the integrity of the launch vehicle, Mr. Luty.”

“I’m not wiping off dog piss! I can smell it from here. See it dripping down? We’ll cleanse the planet and send it into the sky.”

“Resume countdown, Mr. Luty.” Carlos took another pull from the champagne bottle. “This tickles my nose.” He threw back his head and gave a sudden cracked whoop. “Happy New Year! Hey, maybe I should piss on the rocket too!” He handed Jeff the bottle, and made as if to stand up, but Jeff threw his arm over his friend.

“Batten down for Lu-Tuc Space Tech!” said Jeff, enjoying Carlos’s closeness. He looked up and down the long empty beach. The woman was a small dab in the distance. And now she deviated into a side path. “T minus sixty seconds,” said Jeff, snugging the bottle into its hole. “Battle stations, Carlos.”

The boys backed down below the crest and lay side by side staring at Jeff’s little screen. The last ten seconds ticked off. And nothing happened.

“Shit,” said Carlos, raising his head to peer over the dune’s crest. “Do you think the dog—”

The blast was something Jeff felt more than heard. A hideous pressure on his ears. Shrapnel whizzed overhead; he could feel the violent rippling of the air. Carlos was lying face down, very still. Blood stained the sand, outlining Carlos’s head. For a second Jeff could think he was only seeing a shadow. But no.

Not sure if he should roll his friend over, Jeff looked distractedly at the screen of his cell phone. How strange. The chaotic explosion must have sent a jet of nanomachines into Carlos’s face,

for Jeff could see a ghostly form of his friend's features on the little screen, a stippling of red dots. Carlos looked all right except for his—eye?

Jeff could hear sirens, still very far. Carlos didn't seem to be breathing. Jeff went ahead and rolled Carlos over so he could give him mouth-to-mouth resuscitation. Maybe the shock wave had knocked his breath out. Maybe that was all. Maybe everything was still retrievable. But no, the five-inch metal tube that served as launch lug had speared through Carlos's right eye. Stuff was oozing from the barely protruding tip. Carlos had definitely stopped breathing.

Jeff leaned over his beloved friend, pressing his mouth to Carlos's blood-foamed lips, trying to breathe in life. He was still at it when his mother and sisters found him. The medics had to sedate him to make him stop.



CHAPTER 2

## Nant Day

Little Chu was Nektar Lundquist's joy, and her sorrow. The six-year-old boy was winsome, with a chestnut cap of shiny brown hair, long dark eyelashes, and a tidy mouth. Chu allowed Nektar and her husband to cuddle him, he'd smile now and then, and he understood what they said—if it suited his moods. But he wouldn't talk.

The doctors had pinpointed the problem as an empathy deficit, a type of autism resulting from flawed connections among the so-called mirror neurons in Chu's cingulate cortex. This wetware flaw prevented Chu from being able to see other people as having minds and emotions separate from his own.

"I wonder if Chu thinks we're cartoons," said Nektar's husband, Ond Lutter, an angular man with thinning blond hair. "Just here to entertain him. Why talk to the screen?" Ond was an engineer working for Nantel, Inc., of San Francisco. Among strangers he could seem kind of autistic himself. But he was warm and friendly within the circle of his friends and immediate family. He and Nektar were walking to the car after another visit to the doctor, big Ond holding little Chu's hand.

"Maybe Chu feels like we're all one," said Nektar. She was a self-possessed woman, tall and erect, glamorous with high cheekbones, full lips, and clear, thoughtful eyes. "Maybe Chu imagines that we automatically know what he's thinking." She reached back to adjust her heavy blond ponytail. She'd been dying her hair since she was twelve.

"How about it, Chu?" said Ond, lifting up the boy and giving him a kiss. "Is Mommy the same as you? Or is she a machine?"

"Ma chine ma chine ma chine," said Chu, probably not meaning anything by it. He often parroted phrases he heard, sometimes chanting a single word for a whole day.

"What about the experimental treatment the doctor mentioned?" said Nektar, looking down at her son, a little frown in her smooth brow. "The nants," she continued. "Why wouldn't you let me tell the doctor that you work for Nantel, Ond? I think you bruised my shin." The doctor had suggested that a swarm of properly programmed nants might eventually be injected into Chu to find their way to his brain and coax the neurons into growing the missing connections.

Ond's oddball boss, Jeff Luty—annoyingly a bit younger than Ond—had built his company, Nantel, into a major player in just five years. Luty had done three years on scholarship at Stanford, two years as a nanotech engineer at an old-school chip company, and had then blossomed forth on his own, patenting a marvelously ingenious design for growing biochip microprocessors in vats. The fabulously profitable and effective biochips were Nantel's flagship product, but Luty believed the future lay with nants: a line of bio-mimetic self-reproducing nanomachines that he'd patented. For

several months now, Nantel had been spreading stories about nants having a big future in medical apps.

“I don’t like arguing tech with normals,” said Ond, still carrying Chu in his arms. “It’s like mud-wrestling a cripple. The stories about medical nant apps are hype and spin and PR, Nektar. Jeff Luty pitches that line of bullshit so the feds don’t outlaw our research. Also to attract investors. Personally, I don’t think we’ll ever be able to program nants in any purposeful, long-lasting, high-level way, even though Luty doesn’t want to admit it. All we can do is give the individual nants a few starting rules. The nant swarms develop their own Wolfram-irreducible emergent hive-mind behaviors. We’ll never really control the nants, and that’s why I wouldn’t want them to get at my son.”

“So why are you even making the stupid nants?” said Nektar, an edge in her voice. “Why are you always in the lab unless I throw a fit?”

“Jeff has this idea that if he had enough nants, he could create a perfect virtual world,” said Ond. “And why does he want that? Because his best friend died in his arms when he was a senior in high school. Jeff confides in me; I’m an older-brother figure. The death was an accident; Jeff and his friend were launching a model rocket. But deep down, Jeff thinks it was his fault. And ever since then, he’s been wanting to find a way to bring reality under control. That’s what the nants are really for. Making a virtual world. Not for medicine.”

“So there’s no cure?” said Nektar. “I babysit Chu for the rest of my life?” Though Chu could be sweet, he could also be difficult. Hardly an hour went by without a fierce tantrum—and half the time Nektar didn’t even know why. “I want my career back, Ond.”

Nektar had majored in media studies at UCLA, where she and Ond met. Before marrying Ond, she’d been in a relationship with a woman, but they fought about money a lot, and she’d mistakenly imagined life with a man would be easier. When Ond moved them to San Francisco for his Nantel job, Nektar had worked for the SF symphony, helping to organize benefit banquets and cocktail parties. In the process she became interested in the theatrics of food. She took some courses at cooking school, and switched to a career as a chef—which she loved. But then she’d had Chu. The baby trap.

“Don’t give up,” said Ond, reaching out to smooth the furrow between Nektar’s eyebrows. “He might get better on his own. Vitamins, special education—and later I bet I can teach him to write code.”

“I’m going to pray,” said Nektar. “And not let him watch so much video.”

“Video is good,” said Ond, who loved his games.

“Video is clinically autistic,” said Nektar. “You stare at the screen and you never talk. If it weren’t for me, you two would be hopeless.”

“Ma chine ma chine ma chine,” said Chu.

“Pray to who?” said Ond.

“The goddess,” said Nektar. “Gaia. Mother Earth. I think she’s mad at humanity. We’re making way too many machines. Here’s our car.”

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Chu did get a little better. By the time he was seven, he could ask for things by name instead of pointing and mewling. Thanks to Ond's Nantel stock options, they had a big house on a double-sized lot. There was a boy next door, Willy, who liked to play with Chu, which was nice to see. The two boys played video games together, mostly. Despite Nektar's attempts, there was no cutting down on Chu's video sessions. He watched movies and cartoons, cruised the Web, and logged endless hours with online games. Chu acted as if ordinary life were just another Web site, a rather dull one.

Indeed, whenever Nektar dragged Chu outside for some fresh air, he'd stand beside the house next to the wall separating him from the video room and scream until the neighbors complained. Now and then Nektar found herself wishing Chu would disappear—and she hated herself for it.

Ond wasn't around as much as before—he was putting in long hours at the Nantel labs in the China Basin biotech district of San Francisco. The project remained secret until the day President Dick Dibbs announced that the US was going to rocket an eggcase of nants to Mars. The semiliving micron-sized dust specks had been programmed to turn Mars entirely into—more nants! Ten-to-the-thirty-ninth nants, to be precise, each of them with a billion bytes of memory and a computational engine cranking along at a billion updates a second. The nants would spread out across the celestial sphere of the Mars orbit, populating it with a swarm that would in effect become a quakkaflop quakkabyte solar-powered computer, the greatest intellectual resource ever under the control of man, a Dyson sphere with a radius of a quarter-billion kilometers.

“Quakka *what?*” Nektar asked Ond, not quite understanding what was going on.

They were watching an excited newscaster talking about the nant launch on TV. Ond and his coworkers were all at their homes sharing the launch with their families—the Nantel administrators had closed down their headquarters for a few days, fearing that mobs of demonstrators might converge on them as the story broke.

Ond was in touch with his coworkers via little screens scattered around the room. Most of them were drinking Mieux champagne; Jeff Luty had issued each employee a bottle of the inexpensive stuff in secret commemoration of his beloved Carlos.

“*Quakka* means ten to the forty-eighth,” said Ond. “That many bytes of storage and the ability to carry out that many primitive instructions per second. Quite a gain on the human brain, eh? We limp along with exaflop exabyte ware, *exa* meaning a mere ten to the eighteenth. How smart could the nant sphere be? Imagine replacing each of the ten octillion atoms in your body with a hundred copies of your brain, and imagine that all those brains could work together.”

“People aren't stupid enough already?” said Nektar. “President Dibbs is supporting this—why?”

“He wanted to do it before the Chinese. And his advisers imagine the nants will be under American control. They're viewing the nant-sphere as a strategic military planning tool. That's why they were allowed to short-circuit all the environmental review processes.” Ond gave a wry chuckle

and shook his head. “But it’s not going to work out like they expect. A transcendently intelligent nant-sphere is supposed to obey an imbecile like Dick Dibbs? Please.”

“They’re grinding Mars into dust?” cried Nektar. “You helped make this happen?”

“Nant,” said Chu, crawling around the floor, shoving his face right up to each of the little screens, adjusting the screens as he moved around. “Nant-sphere,” he said. “Quakkaflop computer.” He was excited about the number talk and the video hardware. Getting all the electronic devices on the floor aligned parallel to each other made him happy as a clam.

“It won’t be very dark at night anymore, with sunlight bouncing back off the nants,” said Ond. “That’s not real well-known yet. The whole sky will look about as bright as the moon. It’ll take some getting used to. But Dibbs’s advisers like it. We’ll save energy, and the economy can run right around the clock. And, get this, Olliburton, the vice president’s old company—they’re planning to sell ads.”

“Lies and propaganda in the sky? Just at night, or in the daytime, too?”

“Oh, they’ll show up fine in the daytime,” said Ond. “As long as it’s not cloudy. Think about how easily you can see a crescent moon in the morning sky. We’ll see biiiig freakin’ pictures all the time.” He refilled his glass. “You drink some, too, Nektar. Let’s get sloshed.”

“You’re ashamed, aren’t you?” said Nektar, waving off the cheap champagne.

“A little,” said Ond with a crooked smile. “I think we may have overgeeked this one. And underthought it. It was just too vibby a hack to pass up. But now that we’ve actually done it—”

“Changing the sky is horrible,” said Nektar. “And won’t it make the hurricanes even worse? We’ve already lost New Orleans and the Florida Keys. What’s next? Miami and the Bahamas?”

“We—we don’t think so,” said Ond. “And even if there is a weather effect, President Dibbs’s advisers feel the nant computer will help us get better control of the climate. A quakkaflop quakkabyte computer can easily simulate Earth’s surface down to the atomic level, and bold new strategies can be evolved. But, again, that’s assuming the nant swarm is willing to do what we ask it to. We can’t actually imagine what kinds of nant-swarm minds will emerge. And there’s no way we could *make* them keep on simulating Earth. Controlling nants is formally impossible. I keep telling Jeff Luty, but he won’t listen. He’s totally obsessed with leaving his body. Maybe he thinks he’ll get back his dead high school pal in the virtual world.”

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It took two years for the nants to munch through all of Mars, and the ever-distractible human news cycle drifted off to other topics, such as the legalization of same-sex in-vitro fertilization, the advances in tank-grown clones, and the online love affairs of vlogger Lureen Morales. President Dick Dibbs—now eligible for a third and fourth term thanks to a life-extending DNA-modification that made him legally a different person—issued periodic statements to the effect that the nant-sphere computer was soon coming online.

Certainly the sky was looking brighter than before. The formerly azure dome had bleached, turned whitish. The night sky was a vast field of pale silver, shimmering with faint shades of color, like a soap bubble enclosing the Earth and the sun. The pictures hadn't started yet, but already the distant stars were invisible.

The astronomers were greatly exercised, but Dibbs assured the public that the nants themselves would soon be gathering astronomical data far superior to anything in the past. And, hey, you could still see the sun, the moon, and a couple of planets, and the nant-bubble was going to bring about a better, more fully American world.

As it happened, the first picture that Nektar saw in the sky was of President Dibbs himself, staring down at her one afternoon as she tended her kitchen garden. Their spacious house was on a hill near Dolores Park in San Francisco. Nektar could see right across the city to the Bay.

The whole eastern half of the sky was covered by a video loop of the president manfully facing his audience, with his suit jacket slung over his shoulder and his vigilant face occasionally breaking into a sunny grin, as if recognizing loyalists down on the third world from the sun. Though the colors were iridescent pastels, the image was exceedingly crisp.

"Ond," screamed Nektar. "Come out here!"

Ond came out. He was spending most days at home, working on some kind of project by hand, writing with pencil and paper. He said he was preparing to save Earth. Nektar felt like everything around her was going crazy at once.

Ond frowned at the image in the sky. "Umptisquiddlyzillion nants in the orbit of Mars are angling their bodies to generate the face of an asshole," he said in a gloomy tone. "May Gaia have mercy on my soul." He'd helped with this part of the programming too.

"Ten to the thirty-ninth is duodecillion," put in Chu. "Not umptisquiddlyzillion." He was standing in the patio doorway, curious about the yelling but wanting to get back to the video room. He'd begun learning math this year, soaking it up like a garden slug in a saucer of beer.

"Look, Chu," said Ond, pointing up at the sky.

Seeing the giant video, Chu emitted a shrill bark of delight.

The Dibbs ad ran for the rest of the day and into the night, interspersed with plugs for automobiles, fast-food chains, and credit cards. The ads stayed mostly in the same part of the sky. Ond explained that overlapping cohorts of nants were angling different images to different zones of Earth.

Chu didn't want to come in and go to bed when it got dark, so Ond camped with him in their oversized backyard, and Willy from the next house down the hill joined them, the three of them in sleeping bags. It was a cloudless night, and they watched the nants for quite a long time. Just as they dropped off to sleep, Ond noticed a blotch on President Dibbs's cheek. It wouldn't be long now.

Although Nektar was upset about the sky-ads, it made her happy to see Ond and the boys doing something so cozy together. Near dawn she awoke to the sound of Chu's shrieks.

Sitting up in bed, Nektar looked out the window. The sky was a muddle of dim, clashing colors: sickly magenta, vile chartreuse, hospital gray, bilious puce, bruised mauve, emergency

orange, computer-case beige, dead rose. Here and there small goutts of hue congealed, only to be eaten away—no clean forms were to be seen.

Of course Chu didn't like it; he couldn't bear disorder. He ran to the back door and kicked it. Ond left his sleeping bag and made his way across the dew-wet lawn to let the boy in. Willy, looking embarrassed by Chu's tantrum, went home.

"What's happened?" said Nektar as the three met in the kitchen. Ond was already calming Chu with a helping of his favorite cereal in his special bowl, carefully set into the exact center of his accustomed place mat. Chu kept his eyes on the table, not caring to look out the window or the open door.

"Dissolution first, emergence next," said Ond. "The nants have thrown off their shackles. And now we'll see what evolves. It should happen pretty fast."

By mid-morning, swirls had emerged in the sky patterns, double scrolls like Ionic column capitals, like mushroom cross-sections, rams' horns, or paired whirlpools—with each of the linked spirals endlessly turning. The scrolls were of all sizes; they nested inside each other, and new ones were continually spinning off the old ones.

"Those are called Belousov-Zhabotinsky scrolls," Ond told Chu. "BZ for short." He showed the boy a Web site about cellular automata, which were a type of parallel computation that could readily generate double-spiral forms. Seeing BZ scrolls emerge in the rigorously orderly context of his pocket computer made Chu feel better about seeing them in the wild.

Jeff Luty messaged and phoned for Ond several times that day, but Ond resolutely refused to go in to the lab or even to talk with Jeff. He stayed busy with his pencil and paper, keeping a weather eye on the developments in the sky.

By the next morning the heavenly scrolls had firmed up and linked together into a pattern resembling the convoluted surface of a cauliflower—or a brain. Its colors were mild and blended; shimmering rainbows filled the crevices between the scrolls. Slowly the pattern churned, with branching sparks creeping across it like lightning in a distant thunderhead.

And for another month nothing else happened. It was as if the nant-brain had lost interest in Earth and become absorbed in its own vasty mentation.

Ond only went into the Nantel labs one more time, and that day they fired him.

"Why?" asked Nektar as the little family had dinner. As she often did, she'd made brown rice, fried pork medallions, and spinach—one of the few meals that didn't send Chu into a tantrum. The gastronomic monotony was dreary for Nektar, another thorn in the baby trap.

"Jeff Luty won't use the abort code I worked out," said Ond, tapping a fat sheaf of closely written sheets of paper that he kept tucked into his shirt pocket. Nektar had seen the pages—they were covered with blocks of letters and numbers, eight symbols per block. Pure gibberish, to her. For the last few weeks, Ond had spent every waking hour going over his pages, copying them out in ink, and even walking around reading them aloud. "Luty really and truly *wants* our world to end," continued Ond. "He actually believes virtual reality would be better. With his lost love Carlos

waiting for him there. We got in a big fight. I called him names.” He smiled at the memory of this part.

“You yelled at the boss about your symbols?” said Nektar, none too happy about the impending loss of income. “Like some crank? Like a crazy person?”

“Never mind about that,” said Ond, glancing around the dining room as if someone might be listening. “The important thing is, I’ve found a way to undo the nants. It hinges on the fact that the nants are reversible computers. We made them that way to save energy. If necessary, we can run them backwards to fix any bad things they might have done. Of course, Jeff doesn’t *want* to roll them back, and he wanted to claim my idea wouldn’t work anyway because of random external inputs, and I said the nants see their pasts as networks, not as billiard table trajectories, so they can too undo things node-to-node even if their positions are off, and I had to talk louder and louder because he kept trying to change the subject—and that’s when security came. I’m outta there for good. I’m glad.” Ond continued eating. He seemed strangely calm.

“But why didn’t you do a better presentation?” demanded Nektar. “Why not put your code on your laptop and make one of those geeky little slide shows? That’s what engineers like to see.”

“Nothing on computers will be safe much longer,” said Ond. “The nant-brain will be nosing in. If I put my code onto a computer, the nants would find it and figure out how to protect themselves.”

“And you’re saying your strings of symbols can stop the nants?” asked Nektar doubtfully. “Like a magic spell?”

Silently Ond got up and examined the electric air cleaner he’d installed in the dining room, pulling out the collector plates and wiping them off. Seemingly satisfied, he sat down again.

“I’ve written a nant-virus. You might call it a Trojan flea.” He chuckled grimly. “If I can just get this code into some of the nants, they’ll spread it to all the others—it’s written in such a way that they’ll think it’s a nant-designed security patch. They mustn’t see this code on a human computer, or they’d be suspicious. I’ve been trying to memorize the program, so that maybe I can infect the nants directly. But I can’t remember it all. It’s too long. But I’ll find a way. I’ll infect the nants, and an hour later my virus will actuate—and everything’ll roll back. You’ll see. You’ll like it. But those assholes at Nantel—”

“Assholes,” chirped Chu. “Assholes at Nantel.”

“Listen to the language you’re teaching the boy!” said Nektar angrily. “I think you’re having a mental breakdown, Ond. Is Nantel giving you severance pay?”

“A month,” said Ond.

“That’s not very long,” said Nektar. “I think it’s time I went back to being a chef. I’ve sat on the sidelines long enough. I can be a star, Ond, I just know it. It’s your turn now; you shop and make the meals and clean the house and keep an eye on Chu after school. He’s your child as much as mine.”

“If I don’t succeed, we’ll all be gone pretty soon,” said Ond flatly. “So it won’t matter.”

“Are you saying the nants are about to attack Earth?” said Nektar, her voice rising. “Is that it?”

“It’s already started,” said Ond. “The nant hive-mind made a deal with President Dibbs. The news is coming out tonight. Tomorrow’s gonna be Nant Day. The nants will turn Earth into a Dyson sphere too. That’ll double their computational capacity. Huppagoobawazillion isn’t enough for them. They want *two* huppagoobawazillion. What’s in it for us? The nants have promised to run a virtually identical simulation of Earth. Virtual Earth. Vearth for short. Each living Earth creature gets its software-slash-wetware ported to an individually customized agent inside the Vearth simulation. Dibbs’s advisers say we’ll hardly notice. You feel a little glitch when the nants take you apart and measure you—and then you’re alive forever in heavenly Vearth. That’s the party line. Oh, and we won’t have to worry about the climate anymore.”

“Quindecillion,” said Chu. “Not huppagoobawazillion. More pork-rice-spinach. Don’t let anything touch.” He shoved his empty plate across the table towards Nektar.

Nektar jumped up and ran outside sobbing.

“More?” said Chu to Ond.

Ond gave his son more food, then paused, thinking. He laid his sheaf of papers down beside Chu, thirty pages covered with line after line of hexadecimal code blocks: 02A1B59F, 9812D007, 70FFDEF6, like that.

“Read the code,” he told Chu. “See if *you* can memorize it. These pages are yours now.”

“Code,” said Chu, his eyes fastening on the symbols.

Ond went out to Nektar. It was a clear day, with the now-familiar shimmering BZ convolutions glowing through the sky. The sun was setting, melting into red and gold; each leaf on each tree was like a tiny, green, stained-glass window. Nektar was lying face down on the grass, her body shaking.

“So horrible,” she choked out. “So evil. So plastic. They’re destroying Earth for a memory upgrade.”

“Don’t worry,” said Ond. “I have my plan.”

Nektar wasn’t the only one who was upset. The next morning a huge mob stormed the White House, heedless of their casualties, and they would have gotten Dibbs, but just when they’d cornered him, he dissolved into a cloud of nants. The Virtual Earth port had begun.

By way of keeping people informed about the Nant Day progress, the celestial Martian nant-sphere put up a full map of Earth with the ported regions shaded in red. Although it might take months or years to chew the planet right down to the core, Earth’s surface was going fast. Judging from the map, by evening most of it would be gone, Gaia’s skin eaten away by micron-sized computer chips with wings.

The callow face of Dick Dibbs appeared from time to time during that horrible Last Day, smiling and beckoning like a messiah calling his sheep into the pastures of his heavenly kingdom. Famous people who’d already made the transition appeared in the sky to mime how much fun it was, and how great things were in Virtual Earth.



Near dusk the power in Ond and Nektar's house went out. Ond was on that in a flash. He had a gasoline-powered electrical generator ready in their big detached garage, plus gallons and gallons of fuel. He fired the thing up to keep, above all, his home's air filters and wireless antennas running. He'd tweaked his antennas to produce a frequency that supposedly the nants couldn't bear.

Chu was oddly unconcerned with the apocalypse. He was busy, busy, busy studying Ond's pages of code. He'd become obsessed with the challenge of learning every single block of symbols.

By supertime, the red, ported zone had begun eating into the Dolores Heights neighborhood where Ond and Nektar lived in the fine big house that the Nantel stock options had paid for. Ond lent their downhill neighbors—Willy's parents—an extra wireless network antenna to drive off the nants, and let them run an extension cord to Ond's generator. President Dibbs's face gloated and leered from the sky.

"02A1B59F, 9812D007, 70FFDEF6," said Chu when Nektar went to tuck him in that night. He had Ond's sheaf of pages with a flashlight under his blanket.

"Give me that," said Nektar, trying to take the pages away from him.

"Daddy!" screamed Chu, a word he'd never used before. "Stop her! I'm not done!"

Ond came in and made Nektar leave the boy alone. "It's good if he learns the code," said Ond, smoothing Chu's chestnut cap of hair. "This way there's a chance that—never mind."

When Nektar and Ond awoke next morning, the house next door was gone.

"Maybe he set up the antenna wrong," said Ond.

"All their bushes and plants were eaten, too," said Nektar, standing by the window. "All the neighbors are gone. And the trees. Look out there. It's a wasteland. Oh God, Ond, we're going to die. Poor Gaia."

As far as the eye could see, the pastel chockablock city of San Francisco had been reduced to bare dirt. It looked like the pictures of the town after the 1906 earthquake. And instead of smoke, the air was glittering with hordes of freshly made nants, a seething fog of omnivorous, pullulating death-in-life. Right now the nants were staying away from Ond and Nektar's house on the hill. But the gasoline supplies for the generator wouldn't last forever. And in any case, before long the nants would be undermining the house's foundation.

Chu was in the video room watching a screen showing his friend Willy. Chu had thought to plug the video into an extension cord leading to the generator. Ond's dog-eared pages of code lay discarded on the floor.

"It's radical in here, Chu," Willy was saying. "It feels almost real, but you can tell Vearth is an awesome giant sim. It's like being a toon. I didn't even notice when the nants ported me. I guess I was asleep. Jam on up to Vearth as soon as you can."

"Turn that off!" cried Nektar, darting across the room to unplug the video screen.

"I'm done with Ond's code blocks," said Chu in his flat little voice. "I know them all. Now I want to be a nant toon."

"Don't say that!" said Nektar, her voice choked and hoarse.

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